AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (Currently Amended) A non-linear passive transponder in a wireless electromagnetic tracking system for providing location information for an object in a medical environment, said transponder including:

a coil for transmitting a response signal in a wireless electromagnetic tracking system in response to an excitation signal, wherein said tracking system is capable of determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said signal; and

a rectifying device connected in parallel with said coil to introduce non-linear characteristics into said response signal to allow said tracking system to distinguish said response signal from said excitation signal and to calculate at least one of position and orientation from said non-linear characteristics of said response signal.

2. (Original) The transponder of claim 1 wherein said rectifying device is a diode.

3. (Original) The transponder of claim 1 further including a capacitor connected in parallel with said coil.

4. (Original) The transponder of claim 1 further including a switch connected in series with said rectifying device.

5. (Original) The transponder of claim 3 further including a switch connected in series with said rectifying device or said capacitor.

6. (Original) The transponder of claim 4 further including a controller for controlling the operation of said switch.

7. (Original) The transponder of claim 5 further including a controller for controlling the operation of said switch.

8. (Currently Amended) A method for tracking a transponder in a wireless electromagnetic tracking system for providing location information for an object in a medical environment comprising:

receiving a first signal at a coil in a transponder in a wireless electromagnetic tracking system;

rectifying said first signal with a diode connected in parallel with said coil to generate a second signal, wherein said second signal exhibits characteristics distinct from said first signal due to said rectifying of said first signal;

transmitting a second signal from said coil; and

determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said second signal.

9. (Cancelled)

10. (Original) The method of claim 8 further including varying the capacitance of said transponder with a capacitor connected in parallel with said coil.

11. (Original) The method of claim 10 further including the step of operating a switch connected in series with said diode or said capacitor.

12. (Original) The method of claim 11 further including controlling the operation of said switch with a controller.

13. (Currently Amended) A non-linear passive transponder in a wireless electromagnetic tracking system for providing location information for an object in a medical environment, said transponder consisting of:

a core for transmitting a response signal in a wireless electromagnetic tracking system, wherein said tracking system is capable of determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said response signal;

a coil wrapped around said core to produce said response signal in response to an excitation signal received at said transponder; and

a diode connected to said coil to introduce non-linear characteristics into said response signal to distinguish said response signal from said excitation signal and to

enable said tracking system to determine ~~at least one of~~ said position and orientation of said transponder based at least in part on said response signal.

14. (Original) The transponder of claim 13 further consisting of a capacitor connected to said coil.

15. (Currently Amended) A method for tracking a transponder in a wireless electromagnetic tracking system for providing location information for an object in a medical environment comprising:

receiving a first signal at a transponder in a wireless electromagnetic tracking system, wherein said first signal is received at a first frequency;

transmitting a second signal from said transponder, wherein said second signal contains a second frequency; and

determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said second signal.

16. (Original) The method of claim 15 further comprising the step of rectifying said first signal with a diode.

17. (Original) The method of claim 15 further comprising the step of rectifying said first signal with only one diode.

18. (Original) The method of claim 15 further comprising the step of identifying said transponder based upon said second frequency.

19. (Original) The method of claim 15 further comprising the step of varying the capacitance of said transponder, wherein said change in capacitance changes said second frequency.

20. (Original) The method of claim 19 further comprising the step of identifying said transponder based upon said second frequency.

21. (Currently Amended) A method for transmitting data in a wireless electromagnetic tracking system comprising:

transmitting a signal from a transponder in a wireless electromagnetic tracking system, wherein said signal contains at least a first frequency and a second frequency, wherein said tracking system is capable of determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said signal;

varying at least said second frequency to produce a variation in at least said second frequency; and

encoding data in said signal based upon said variation in at least said second frequency.

22. (Currently Amended) A method for tracking a transponder in a wireless electromagnetic tracking system to provide location information for an object in a medical environment comprising:

receiving a first signal at a transponder in a wireless electromagnetic tracking system, wherein said first signal is received at a first frequency;

transmitting a second signal from said transponder, wherein said second signal includes said first frequency and a second frequency; and

determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said second signal.

23. (Original) The method of claim 22 further comprising the step of rectifying said first signal with a diode.

24. (Original) The method of claim 22 further comprising the step of rectifying said first signal with only one diode.

25. (Original) The method of claim 22 further comprising the step of identifying said transponder based upon said second frequency.

26. (Original) The method of claim 22 further comprising the step of varying the capacitance of said transponder, wherein said change in capacitance changes said second frequency.

27. (Original) The method of claim 26 further comprising the step of identifying said transponder based upon said second frequency.

28. (Currently Amended) A transponder in a wireless electromagnetic tracking system for providing location information for an object in a medical environment, said transponder including:

a coil for transmitting a response signal in a wireless electromagnetic tracking system in response to an excitation signal, wherein said tracking system is capable of determining ~~at least one of~~ a position and orientation of said transponder in relation to a reference coordinate system based at least in part on said response signal; and

a switching device connected in parallel with said coil to alter characteristics of said response signal.

29. (Original) The transponder of claim 28 wherein said switching device is a switching diode.

30. (Original) The transponder of claim 28 wherein said switching device is a synchronous rectifier.

31. (Original) The transponder of claim 28 wherein said switching device is a transistor.

32. (Original) The transponder of claim 28 further including a capacitor connected in parallel with said coil.

33. (Original) The transponder of claim 32 further including a switch connected in series with said capacitor.

34. (Original) The transponder of claim 33 further including a controller for controlling the operation of said switch.

35. (Currently Amended) The transponder ~~system~~ of claim 1, wherein said tracking system determines at least one position and at least one orientation of said transponder.

36. (Currently Amended) The transponder ~~system~~ of claim 1, wherein said tracking system is capable of determining said at least one of a position and orientation of said transponder in relation to a patient anatomy.

37. (Currently Amended) The transponder ~~system~~ of claim 36, wherein said transponder operates in conjunction with a medical device within a patient anatomy.

38. (Currently Amended) The transponder ~~system~~ of claim 1, where said tracking system overlays said reference coordinate system on a medical image.

39. (Previously Presented) The method of claim 8, wherein said determining step further includes determining at least one position and at least one orientation of said transponder in relation to said reference coordinate system.

40. (Previously Presented) The method of claim 8, wherein said wireless electromagnetic tracking system is capable of determining said at least one of a position and orientation of said transponder within a patient anatomy.

41. (Previously Presented) The method of claim 8, further including relating said reference coordinate system to a medical image.